

Appl. No. 10/720,308
Amendment dated April 27, 2007
Reply to Office Action of December 27, 2007

TMI-5008

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Amendments to the Claims:

This listing of claims will replace all prior versions and listing of claims in the application.

Listing of Claims:

1-13. (Canceled)

14. (Currently Amended) A data storage apparatus coupled to a computer, comprising:

a control unit coupled to the computer for processing a command transmitted from the computer, the control unit coupled to the computer;

a memory coupled to the control unit for storing data necessary for the processing of the command by the control unit, the memory coupled to the control unit;

a storage device being a plurality of non-removable storage devices medium and coupled to the control unit; and

a first storage volume and a second storage volume configured on the non-removable storage devices,

wherein the control unit virtualizes at least one of the non-removable storage devices as a virtualized removable storage drive for the computer,

wherein the first storage volume is mapped to the virtualized removable storage drive and the second storage volume is not mapped to the virtualized removable storage drive in a volume management table stored in the memory, and

Appl. No. 10/720,308
Amendment dated April 27, 2007
Reply to Office Action of December 27, 2007

TMI-5008

wherein, in response to a verification command issued by the computer, the control unit replies with identification information of the virtualized removable storage drive so that the computer recognizes the first storage volume as a volume, separate from the second storage volume, that the computer should recognize when the computer is booted~~provides a virtual disk drive unit for the computer so that the control unit makes the computer recognize that the virtual disk drive unit handles a removable storage medium,~~

~~wherein, in response to receiving a first instruction for loading the removable storage medium to the virtual disk drive unit, the control unit modifies relationship information to make a relation between the first storage volume and the virtual disk drive unit, so that the control unit makes the computer recognize that the first storage volume is loaded to the virtual disk drive unit as the removable storage medium.~~

15. (Currently Amended) A~~The~~ data storage apparatus according to claim 14,

wherein, based on receiving a second instruction for ejecting the virtualized removable storage drive~~medium~~ from the virtual disk drive unit from the computer, the control unit modifies the volume management table~~relationship information to delete the relation between the first storage volume and the virtual disk drive unit, so that the control unit makes the computer recognize that the first storage volume is ejected from the virtual disk drive unit as the removable storage medium, and~~

Appl. No. 10/720,308

TMI-5008

Amendment dated April 27, 2007

Reply to Office Action of December 27, 2007

the control unit notifies the computer of completion of ejecting the first storage
volume from the virtual disk drive unit.

16. (Currently Amended) A The data storage apparatus according to claim 14,

wherein the first instruction is sent from a management computer which is
coupled to the data storage apparatus, and

wherein the control unit notifies the management computer of mapping
offloading the first storage volume to the virtualized removable storage drive virtual
disk drive unit.

17. (Currently Amended) A The data storage apparatus according to claim 14,

wherein the first instruction is sent from the computer.

18. (Currently Amended) A The data storage apparatus according to claim 14,

wherein, in response to receiving a verification command for confirming a type
of the virtualized removable storage drive virtual disk drive unit in the data storage
apparatus from the computer, the control unit sends a reply indicating that the
virtualized removable storage drive virtual disk drive unit handles a the removable
storage medium even though the data storage apparatus has the plurality of non-
removable storage devices which is the non-removable storage medium.

Appl. No. 10/720,308
Amendment dated April 27, 2007
Reply to Office Action of December 27, 2007

TMI-5008

19. (Currently Amended) AThe data storage apparatus according to claim 14,
wherein, in response to receiving a verification command for verifying a type
of the virtualized removable storage drive~~virtual disk drive unit~~ of the data storage
apparatus from the computer, the control unit sends a reply indicating that the
virtualized removable storage drive~~virtual disk drive unit~~ is a magnetic disk drive unit
which handles athe removable storage medium even though the data storage
apparatus has the plurality of non-removable storage devices~~which is non-~~
~~removable storage medium~~.

20. (Currently Amended) AThe data storage apparatus according to claim 14,
wherein the second storage volume is set as a replica volume of the first
storage volume, and
wherein the control unit stores data into the first storage volume and the
second storage volume if the control unit receives a write command for writing data
to the virtualized removable storage drive~~medium~~ from the computer.

21. (Currently Amended) AThe data storage apparatus according to claim 19,
wherein, in response to receiving a third instruction for stopping a replication
from the computer, the control unit stops storing the data into the second storage
volume.

Appl. No. 10/720,308
Amendment dated April 27, 2007
Reply to Office Action of December 27, 2007

TMI-5008

22. (Currently Amended) AThe data storage apparatus according to claim 15,
wherein the second storage volume is set as a replica volume of the first
storage volume,

wherein the control unit stores data into the first storage volume and the
second storage volume if the control unit receives a write command for writing data
to the virtualized removable storage drivemedium from the computer, and

wherein, based on receiving the second instruction from the computer, the
control unit stops storing the data into the second storage volume.

23. (Currently Amended) A data storage system comprising:

a computer; and

a data storage apparatus, coupled to the computer, which includes a plurality
of storage volumes which are configured by ~~a non-removable storage~~
devicesmedium and which virtualizes at least one of the non-removable storage
devices as a virtualized removable storage drive~~provides a virtual disk drive unit for~~
the computer, ~~the data storage apparatus making the computer recognize that the~~
~~virtual disk drive unit handles removable storage mediums,~~

wherein a first storage volume is mapped to the virtualized removable storage
drive and a second storage volume is not mapped to the virtualized removable
storage drive in a volume management table stored in a memory.

Appl. No. 10/720,308
Amendment dated April 27, 2007
Reply to Office Action of December 27, 2007

TMI-5008

wherein, in response to a verification command issued by the computer, the data storage apparatus replies with identification information of the virtualized removable storage drive so that the computer recognizes the first storage volume as a volume, separate from the second storage volume, that the computer should recognize when the computer is booted.

wherein the computer sends a first instruction to the data storage apparatus to eject the virtualized removable storage drive, and a first removable storage medium of the removable storage mediums from the virtual disk drive unit,

in response to receiving the first instruction, the data storage apparatus notifies the computer of completion of ejecting the virtualized removable storage drive first removable storage medium from the virtual disk drive unit.

24. (Currently Amended) A-The data storage system according to claim 23,

wherein the data storage apparatus modifies the volume management table relationship information to delete a relation between the virtual drive unit and a first storage volume of the plurality of storage volumes so that the data storage apparatus makes the computer recognize that the first storage volume is ejected loaded to the virtual disk drive unit as the first removable storage medium in response to receiving the first instruction.

Appl. No. 10/720,308
Amendment dated April 27, 2007
Reply to Office Action of December 27, 2007

TMI-5008

25. (Currently Amended) AThe data storage system according to claim 23 further comprising a management computer coupled to the data storage apparatus,

wherein the management computer sends a second instruction to the data storage apparatus to load the virtualized removable storage drive ~~first removable storage medium to the virtual disk drive unit,~~

in response to receiving the second instruction from the management computer, the data storage apparatus modifies the volume management table ~~relationship information~~ to create the relation between the virtualized removable storage drive ~~virtual disk drive unit~~ and the first storage volume so that the data storage apparatus makes the computer recognize that the first storage volume is loaded to the virtualized removable storage drive ~~virtual disk drive unit as the first removable storage medium.~~

26. (Currently Amended) AThe data storage system according to claim 23.

wherein the computer sends a second instruction to the data storage apparatus to load the virtualized removable storage drive ~~first removable storage medium to the virtual disk drive unit,~~

in response to receiving the second instruction from the computer, the data storage apparatus modifies the volume management table ~~relationship information~~ to create the relation between the virtualized removable storage drive ~~virtual disk drive unit~~ and the first storage volume so that the data storage apparatus makes the

Appl. No. 10/720,308
Amendment dated April 27, 2007
Reply to Office Action of December 27, 2007

TMI-5008

computer recognize that the first storage volume is loaded to the virtualized removable storage drive ~~virtual disk drive unit as the first removable storage medium.~~

27. (Currently Amended) AThe data storage system according to claim 23,
wherein a second storage volume of the plurality of storage volumes is set as
a replica storage volume of the first storage volume,

wherein the computer sends a write command for storing data into the
virtualized removable storage drive ~~first removable storage medium~~ to the data
storage apparatus, and

in response to receiving the write command, the data storage apparatus
stores the data into the first storage volume and the second storage volume.

28. (Currently Amended) AThe data storage system according to claim 27,
wherein the computer sends a third instruction to the data storage apparatus
for stopping data replication, and

in response to receiving the third instruction, the data storage apparatus stops
storing the data into the second storage volume.

29. (Currently Amended) AThe data storage system according to claim 23,

Appl. No. 10/720,308
Amendment dated April 27, 2007
Reply to Office Action of December 27, 2007

TMI-5008

wherein a second storage volume of the plurality of storage volumes is set as a replica storage volume of the first storage volume,

wherein the computer sends a write command for storing data into the virtualized removable storage drive ~~first removable storage medium~~ to the data storage apparatus,

in response to receiving the write command, the data storage apparatus stores the data into the first storage volume and the second storage volume, and

in response to receiving the first instruction, the data storage apparatus stops storing the data into the second storage volume and notifies the computer of completion of re-loading the virtualized removable storage drive ~~first removable storage to the virtual disk drive unit~~.

30. (Currently Amended) A The data storage system according to claim 23,

wherein the computer sends a verification command for verifying a type of the virtualized removable storage drive ~~virtual disk drive unit~~ in the data storage apparatus to the data storage apparatus, and

in response to receiving the verification command, the data storage apparatus sends a reply indicating that the virtualized removable storage drive ~~virtual disk drive unit~~ handles a ~~the~~ removable storage medium even though the data storage apparatus has the plurality of non-removable storage devices ~~medium~~.

Appl. No. 10/720,308
Amendment dated April 27, 2007
Reply to Office Action of December 27, 2007

TMI-5008

31. (Currently Amended) ~~A~~The data storage apparatus according to claim 23,
wherein the computer sends a verification command for verifying a type of the
virtualized removable storage drive~~virtual-disk-drive unit~~ in the data storage
apparatus to the data storage apparatus, and

in response to receiving the verification command, the data storage apparatus
sends a reply indicating that the virtualized removable storage drive~~virtual-disk-drive~~
~~unit~~ is a magnetic disk drive which has ~~a~~the removable storage medium even though
the data storage apparatus has ~~a-hard disk drives~~ which are included~~includes in~~ the
non-removable storage ~~devices~~medium.

32. (Currently Amended) ~~A~~The data storage system according to claim 23,
wherein the computer recognizes that the data storage apparatus includes
~~a~~the non-removable storage medium.